

RIC 2006

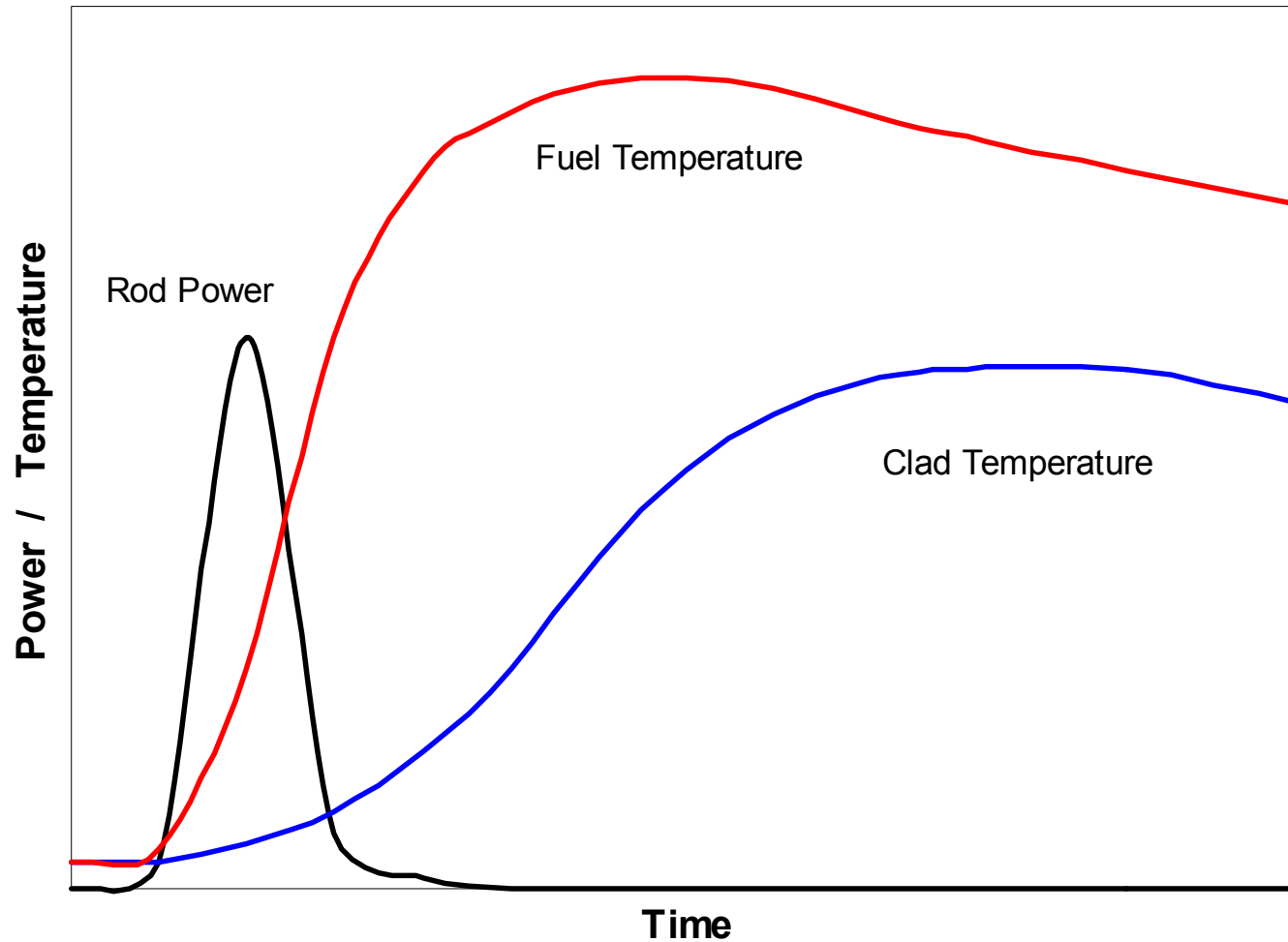
Session T1BC

Fuels - Cladding Behavior for Regulatory Applications

Revising the RIA Regulatory Criteria
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Fuel Response to a Rapid Reactivity Insertion



Current Regulatory Position

General Design Criterion 28

- Regulatory Guide 1.77
- NUREG-0800 Standard Review Plan



RG 1.77 Acceptance Criteria

1. Fuel radial average energy density limited to 280 cal/g at any axial node.
2. Maximum reactor pressure limited to the value that will cause stresses to exceed Service Level C as defined in the ASME Boiler and Pressure Vessel code.
3. Offsite dose consequences limited to well within 10CFR Part 100.

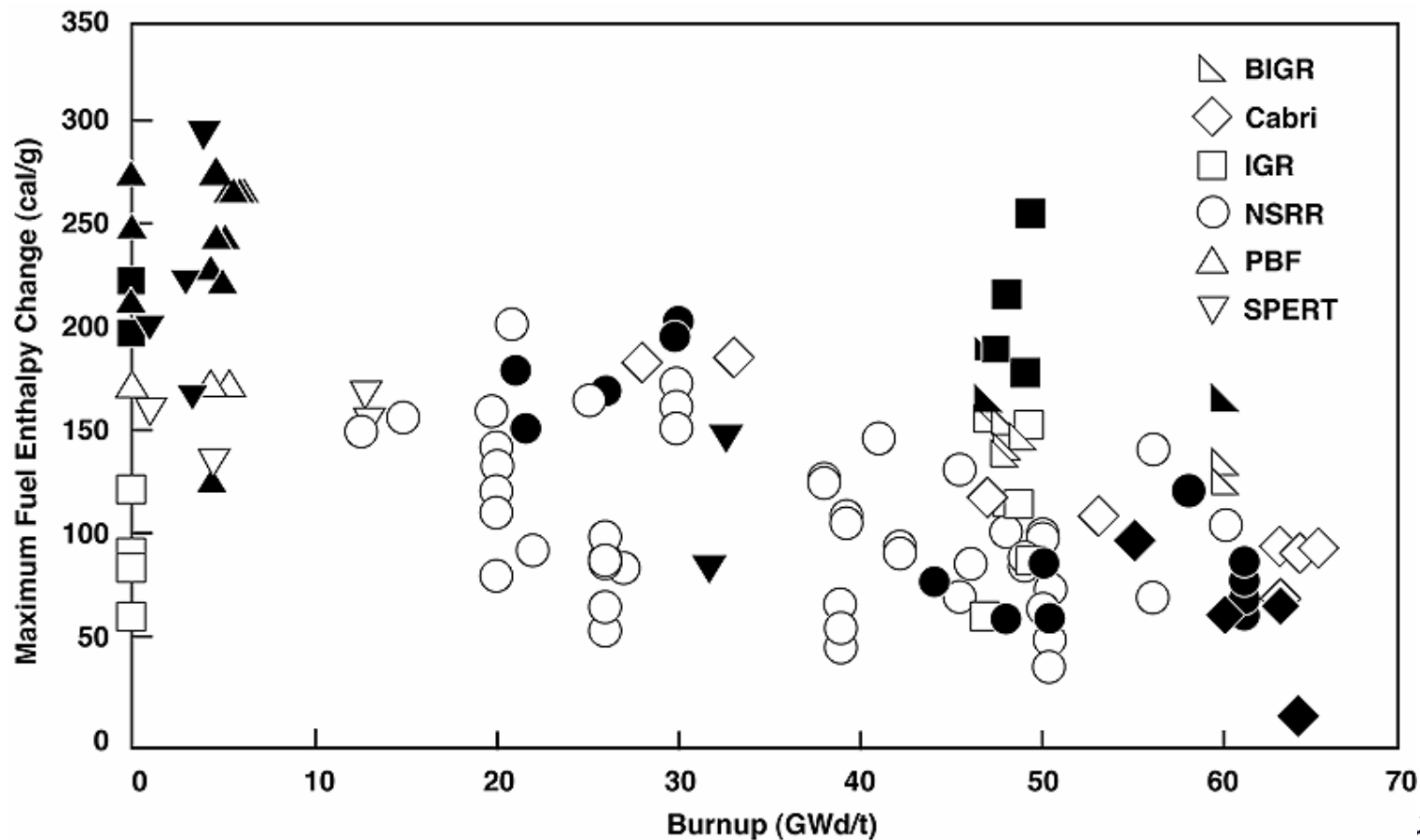


NUREG-0800 Fuel Clad Failure

1. Radial average fuel enthalpy greater than 170 cal/g for BWRs at zero or low power.
2. Local heat flux exceeding fuel thermal design limits (e.g. DNBR and CPR) for all PWR events and at-power events in BWRs.



Empirical Database



RIL 0401 Operability Assessment

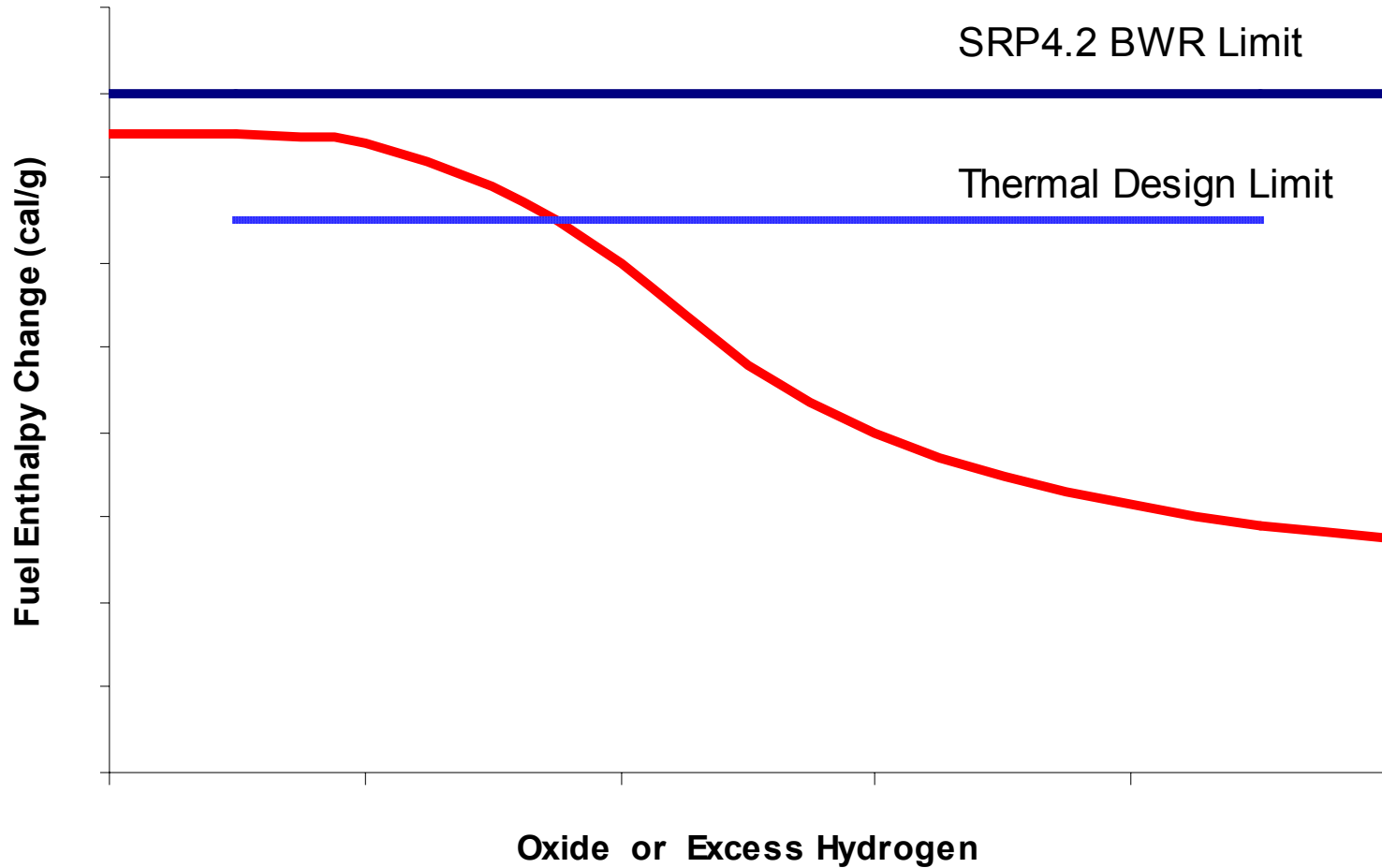
- Developed an empirically-based fuel clad failure threshold.
- Performed a best-estimate neutronics analysis over a range of LWR conditions.
- Concluded that operating reactors are unlikely to experience fuel cladding failure during a postulated RIA.



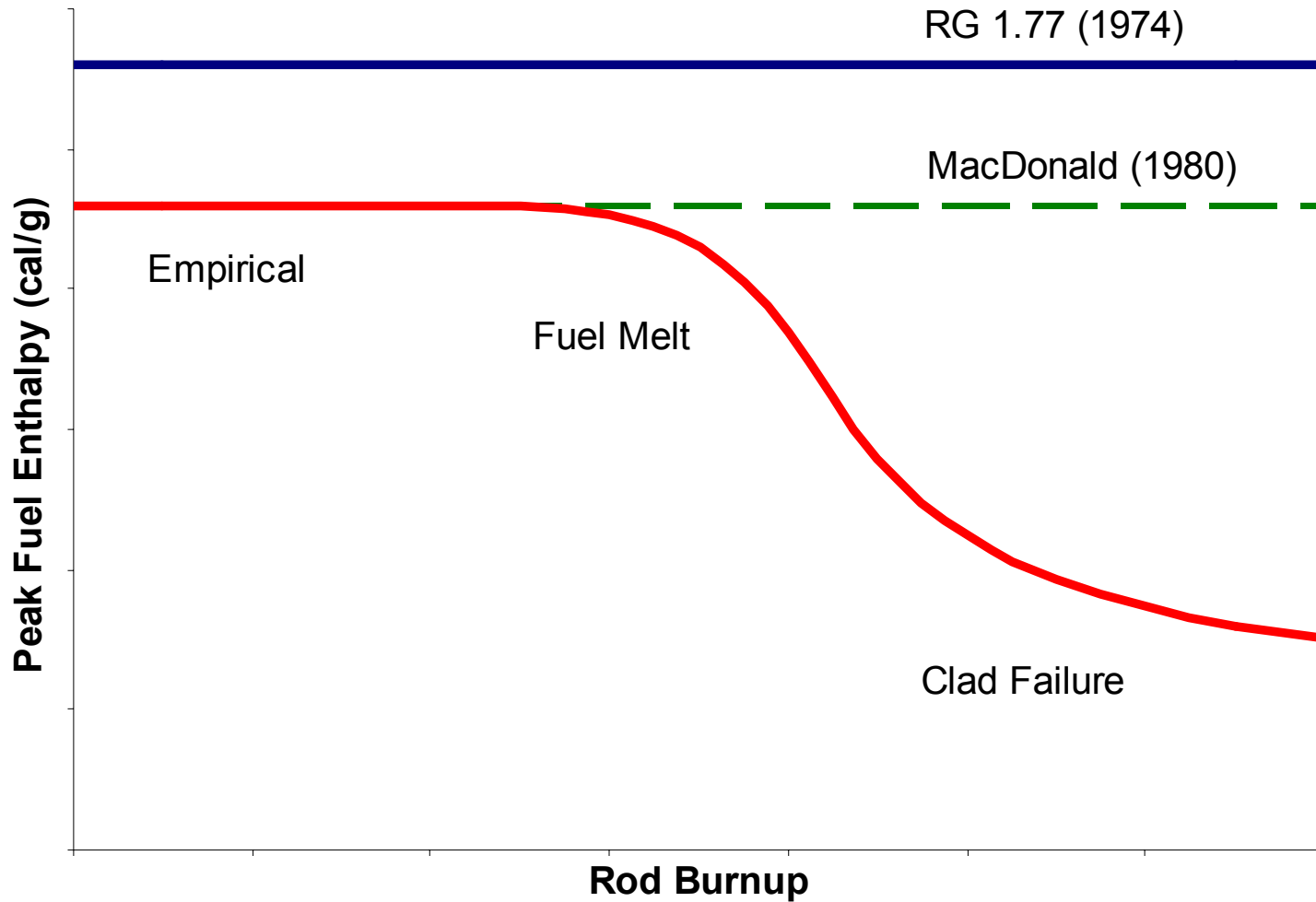
Revising the RIA Regulatory Criteria



Clad Failure Threshold



Core Coolability Limit



Revised Source Term

- Fission product inventory available for release into the reactor coolant system:
 - Steady-state gap inventory
 - Transient-induced fission gas release from pellet
- Significant transient-induced fission gas release experienced during RIA and power-ramp tests.
- Basis of current radiological guidance being investigated to determine whether gap fractions remain conservative.



Conclusion

- No immediate safety concerns related to RIA fuel performance based on RIL 0401.
- NRC will continue efforts to revise criteria and update Regulatory Guides and SRP.
 - Technical basis of revised acceptance criteria being developed.
 - Public meetings will be scheduled during the revision process.

